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Original Research Article

Awareness and Acceptance of HPV Vaccination Among Guardians of Adolescent Girls: A Cross-Sectional Study

Anamika Kumari[1], Swata Mishra[2], Dipti Roy[3]

[1]Senior Resident, Department of Obstetrics and Gynecology, Nalanda Medical College & Hospital, Patna, Bihar, India

[2]Senior Resident, Department of Obstetrics and Gynecology, Nalanda Medical College & Hospital, Patna, Bihar, India

[3]Professor and HOD, Department of Obstetrics and Gynecology, Nalanda Medical College & Hospital, Patna, Bihar, India

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Corresponding Author: Dr. Swata Mishra

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Abstract:

Background: Cervical cancer remains a major public health problem in India, largely caused by persistent Human Papillomavirus (HPV) infection. Despite availability of effective vaccines, uptake remains low, largely influenced by guardians' awareness and perceptions.

Aim: To assess awareness and acceptance of HPV vaccination among guardians of adolescent girls and identify factors influencing acceptance.

Methodology: A hospital-based cross-sectional study was conducted among 1,240 guardians of girls aged 9–17 years attending the Obstetrics and Gynecology outpatient department of Nalanda Medical College & Hospital, Patna. Data were collected using a structured questionnaire. Descriptive statistics, Chi-square test, Wilcoxon rank-sum test, and multivariable logistic regression were applied.

Results: Overall vaccine acceptance was 70.8%. Awareness was moderate: 71.3% had heard of HPV and 82.6% knew vaccination prevents cervical cancer, but only 41.8% knew the recommended vaccination age. Acceptance was significantly associated with higher education (OR 1.86), urban residence (OR 1.34), high knowledge (OR 2.74), perceived infection risk (OR 3.21), and doctor recommendation (OR 4.08), while safety concerns reduced acceptance (OR 0.58).

Conclusion: Although acceptance was favorable, knowledge gaps and safety concerns persist. Physician counseling and targeted awareness programs can significantly improve HPV vaccine uptake.

Keywords: HPV vaccine, cervical cancer prevention, guardians, awareness, acceptance, adolescent girls, cross-sectional study.

Introduction

Cervical cancer has continued to be one of the greatest health dilemmas in the world, especially in the low and middle-income nations. It is the fourth most prevalent cancer in women worldwide and the disease burden of the cancer is high in India; the second most prevalent cancer amongst women. Among the 6,62,301 reported new cervical cancer cases in the world every year, India alone has a contribution of 1,27,526 cases corresponding to crude incidence rate of 17.7 per 1,00,000 women per year, as compared to the rest of the world having an incidence of 14.1 per 1,00,000 women per year [1]. Also, the fatality of cervical cancer in India disproportionality is high, 11.2 deaths per 1,00,000 women per year, as compared to 7.1 death per 1,00,000 women per year in the rest of the world. This is a worrying trend that highlights the necessity of effective preventive practices especially in more disease prone regions. Approximately, 511.4 million of the Indian women aged 15 years and above are those who are at risk of getting cervical cancer [2] on average.

One sexually transmitted disease, human papillomavirus (HPV), is considered the main etiological factor in the occurrence of cervical cancer. Most of HPV infections (about 80% of them) are resolved on their own, however, long-term infections due to high-risk types of the HPV may lead to cervical intraepithelial neoplasia and ultimately invasive cervical cancer [3]. Of the myriads of strains of HPV, HPV 16 and 18 are most oncogenic, with HPV 16 and 18 causing approximately 71 and 80-85 percent of cervical cancer cases throughout the world and in India respectively [4]. In general, approximately 5 percent of women in the general population have HPV 16/18 in their cervices at any given time. These

types are more abundant when cervical lesions are of high grade, squamous intraepithelial lesions (LSIL) and squamous intraepithelial lesions (HSIL) 83.2% and 62.8% respectively.

Fortunately, two complementary approaches to preventing cervical cancer include HPV vaccination and regular screening of cervical cancer. There is evidence of efficacy of vaccination against HPV types of high risk. Since 2008, bivalent and quadrivalent HPV vaccines have been licensed in India and nonavalent vaccines since 2018. In 2016, the Government of India came up with an operational plan of preventing and managing cervical cancer, which has recommendations on cervical cancer screening of women aged 30-65 years [5]. In spite of such attempts, the coverage of screening is very low. According to the National Family Health Survey (NFHS-5) 20192021, only 1.5% of women aged 3049 years in Uttar Pradesh have ever screened cervical cancer, and there are minor differences between urban (1.1) and rural regions (1.7) [6]. More alarming, the rate of HPV vaccination among adolescent girls in India also has a pathetic outcome as less than 1 percent are reported to have undergone the vaccine.

The World Health Organization (WHO) has placed a significant emphasis on the need to scale up on HPV vaccination as one of its global plans to eradicate cervical cancer. The aim is to vaccinate 90 percent of girls before sexual activity starts and girls aged between 9-14 years will be the target population. The secondary target group is that of girls above the age of 15 years and boys, as long as vaccination is possible and it does not take away resources available to the primary target [7]. In 2022, WHO authorized using one dose of HPV vaccine in people aged 920 years as an off-label on the basis of which the one-dose schedule has been shown to be similarly effective and has the potential to increase the proportion of people who become vaccinated in the population [8] by a significant margin.

In India, the HPV vaccine has not been included in the National Immunization Program (NIP) fully, despite its coverage in the budget of 2024. This underscores a dire necessity to increase the coverage of screening and vaccination to minimize the cervical cancer burden. Nursing and paramedical staff particularly the health care provider is key in advocacy of vaccines and education of communities regarding health because of their wide contact with the community. The experience of numerous countries has shown that nursing staff can make significant contributions to the process of acceptance of vaccines due to the possibility of education and advocacy [9,10]. In addition, the education of female nursing and paramedical students can also improve their personal vaccination and, at the same time, serve them as effective role models in the process of encouraging the community to get vaccinated given that they are themselves eligible to receive HPV vaccination.

Since the cervical cancer screening and HPV vaccination rates remain low in Uttar Pradesh, it is urgent to comprehend the factors that affect the vaccination awareness and acceptance rates among adolescent girls guardians. Parents usually do important health decisions concerning the health of their children such as vaccination and their knowledge, attitudes, and perceptions have a direct influence on vaccine uptake. Knowledge of these factors can be used to make informed interventions that would enhance vaccine coverage.

Thus, this research was aimed at achieving the following goals: (1) to determine the awareness of HPV and HPV vaccines in the eyes of guardians of adolescent girls aged between 9 and 17 years; (2) to evaluate the acceptance of HPV vaccination and factors that affect the acceptance; and (3) to present evidence that will be useful in designing more effective and evidence-based interventions to improve HPV vaccination coverage among adolescent girls. By fulfilling these goals, the research will likely make a contribution to the broader project of decreasing the cervical cancer burden in India and make one step closer to the WHO aim of eradicating cervical cancer by 2030.

Methodology

Study Design: A cross-sectional study was conducted to assess the awareness and acceptance of HPV vaccination among guardians of adolescent girls.

Study Area: The study was carried out in the Department of Obstetrics and Gynecology, Nalanda Medical College & Hospital, Patna, Bihar, India.

Study Duration: The study was conducted over 6 months, from April 2025 to September 2025.

Study Population and Sample Size: The study population consisted of guardians of adolescent girls aged 9–17 years attending the outpatient department of Obstetrics and Gynecology. A total of 1240 participants were included in the study.

Sampling Method: Participants were recruited using a convenience sampling method from guardians accompanying adolescent girls to the hospital. All eligible guardians attending during the study period were invited to participate.

Inclusion Criteria

- Guardians of girls aged 9–17 years.
- Guardians residing in Patna, Bihar, for at least 6 months.
- Guardians who consented to participate in the study.

Exclusion Criteria

- Guardians whose girls had already received the HPV vaccine.
- Guardians unwilling to participate or provide informed consent.
- Guardians with communication difficulties that prevented completion of the questionnaire.

Data Collection: Data were collected using a structured and pretested questionnaire specifically designed to assess the awareness and acceptance of HPV vaccination among guardians of adolescent girls. The questionnaire included sections on demographic information (such as age, education, marital status, employment, income, and relationship with the child), knowledge and awareness of HPV and HPV vaccination, attitudes toward the vaccine (including perceived importance, safety, and effectiveness), cues to action (such as recommendations from healthcare providers, media exposure, or influence from relatives and peers), and reasons for vaccine refusal if applicable. Responses were recorded using 5-point Likert scales ranging from strongly agree to strongly disagree, along with dichotomous yes/no items. The questionnaire was adapted from previously validated tools and reviewed by experts to ensure clarity and relevance to the local context.

Procedure: Prior to data collection, a pilot study was conducted with 30 guardians to assess the clarity, comprehensibility, and validity of the questionnaire. Based on feedback from the pilot, minor revisions were made to simplify language and improve understanding. Investigators were trained in standardized procedures to ensure consistent explanation of the study and accurate collection of responses. During the study, guardians attending the outpatient department of Obstetrics and Gynecology at Nalanda Medical College & Hospital were approached and provided with detailed information about the study objectives. Written informed consent was obtained from all participants before administration of the questionnaire. Participants completed the questionnaire on-site, and investigators were available to clarify any questions. Quality control measures were implemented through on-site supervision to ensure completeness, accuracy, and authenticity of the collected data.

Statistical Analysis: Collected data were analyzed using R software version 4.3.2 (R Foundation for Statistical Computing, Vienna, Austria). Descriptive statistics, including frequencies and percentages, were used to summarize demographic characteristics and responses related to HPV knowledge, attitudes, and acceptance. Differences between guardians who were willing and those unwilling to vaccinate their daughters were assessed using Chi-square tests for categorical variables and the Wilcoxon rank-sum test for non-parametric data. Factors associated with vaccine acceptance were first examined using univariate analysis. Variables found significant in univariate analysis were subsequently included in a multivariable logistic regression model using the forward stepwise method to identify independent predictors of HPV vaccine acceptance. Model fit was evaluated using the Hosmer-Lemeshow test, and a p-value of <0.05 was considered statistically significant."

Result

Table 1 describes the socio-demographic characteristics of 1240 participants. The largest age group was 26–35 years (432; 34.8%), followed by 36–45 years (358; 28.9%), 18–25 years (268; 21.6%), and >45 years (182; 14.7%). Females constituted a higher proportion (726; 58.5%) than males (514; 41.5%). Regarding education, most had secondary education (498; 40.2%), followed by graduates (406; 32.7%), primary education (186; 15%), and postgraduates (150; 12.1%). A majority resided in rural areas (704; 56.8%) compared to urban areas (536; 43.2%). In terms of monthly family income, the largest group earned INR 10,001–25,000 (404; 32.6%), followed by <10,000 (318; 25.6%), INR 25,001–50,000 (316; 25.5%), and >50,000 (202; 16.3%).

Table 1: Socio-Demographic Characteristics of Participants (N = 1240)

Variables	Frequency (n)	Percentage (%)
Age Group (years)		
18–25	268	21.6
26–35	432	34.8
36–45	358	28.9
>45	182	14.7
Gender		
Male	514	41.5
Female	726	58.5
Education Level		
Primary	186	15
Secondary	498	40.2
Graduate	406	32.7
Postgraduate	150	12.1

Residence		
Rural	704	56.8
Urban	536	43.2
Monthly Family Income (INR)		
<10,000	318	25.6
10,001–25,000	404	32.6
25,001–50,000	316	25.5
>50,000	202	16.3

Table 2 shows participants' knowledge regarding HPV and the HPV vaccine. Most respondents had heard about HPV (884; 71.3%), and a higher proportion correctly identified that HPV causes cervical cancer (956; 77.1%) and that the vaccine prevents cervical cancer (1024; 82.6%). Awareness of sexual transmission was also high (902; 72.7%). However, knowledge gaps were observed in specific preventive aspects: only 518 (41.8%) knew the recommended vaccination age, 734 (59.2%) were aware that screening is still required after vaccination, and 668 (53.9%) knew that multiple doses are necessary. Overall, the average knowledge score was moderate at 4.58 ± 1.82.

Table 2: Knowledge Regarding HPV and HPV Vaccine

Variables	Correct Cases (n)	Proportion (%)
Heard about HPV	884	71.3
HPV causes cervical cancer	956	77.1
Vaccine prevents cervical cancer	1024	82.6
Recommended vaccination age known	518	41.8
HPV transmitted sexually	902	72.7
Screening required after vaccination	734	59.2
Multiple doses required	668	53.9
Average knowledge score (Mean ± SD)	**4.58 ± 1.82**	

Table 3 presents the univariate analysis of factors associated with HPV vaccine acceptance among 1240 participants, of whom 878 accepted and 362 refused vaccinations. Acceptance was significantly higher among participants with high education (630/828) compared to low education (248/412) ($p < 0.001$). Urban residents showed greater acceptance (418/536) than rural residents (460/704) ($p = 0.021$). Individuals with high knowledge levels had markedly higher acceptance (632/768) than those with low knowledge (246/472) ($p < 0.001$). Doctor recommendation strongly influenced uptake, with acceptance in 620/726 participants who received recommendation versus 258/514 without it ($p < 0.001$). Similarly, participants perceiving high infection risk demonstrated greater acceptance (568/692) compared to those with low perceived risk (310/548) ($p < 0.001$). Overall, education, urban residence, knowledge, physician advice, and perceived susceptibility were significant predictors of HPV vaccine acceptance.

Table 3: Acceptance of HPV Vaccination (Univariate Analysis)

Variables	Total (n=1240)	Refuse (n=362)	Accept (n=878)	p-value
Education				
Low	412	164	248	<0.001
High	828	198	630	
Residence				
Rural	704	244	460	0.021
Urban	536	118	418	
Knowledge Level				
Low	472	226	246	<0.001
High	768	136	632	
Doctor Recommendation				
No	514	256	258	<0.001
Yes	726	106	620	
Perceived Infection Risk				
Low	548	238	310	<0.001
High	692	124	568	

Table 4 shows the multivariable logistic regression analysis for factors associated with vaccine acceptance. Higher education (OR = 1.86; 95% CI: 1.26–2.73; p = 0.002) and urban residence (OR = 1.34; 95% CI: 1.01–1.79; p = 0.041) were significant positive predictors of acceptance. Participants with high knowledge scores (OR = 2.74; 95% CI: 2.05–3.67; p < 0.001) and high perceived infection risk (OR = 3.21; 95% CI: 2.28–4.52; p < 0.001) were substantially more likely to accept vaccination. The strongest association was observed with doctor recommendation (OR = 4.08; 95% CI: 2.98–5.59; p < 0.001). Conversely, concern about side effects significantly reduced acceptance (OR = 0.58; 95% CI: 0.39–0.86; p = 0.009). Overall, awareness, perceived risk, and medical advice increased vaccine acceptance, while safety concerns decreased it.

Table 4: Multivariable Logistic Regression for Vaccine Acceptance

Variables	p Value	OR	95% CI
Higher education	0.002	1.86	1.26–2.73
Urban residence	0.041	1.34	1.01–1.79
High knowledge score	<0.001	2.74	2.05–3.67
High perceived infection risk	<0.001	3.21	2.28–4.52
Doctor recommendation	<0.001	4.08	2.98–5.59
Concern about side effects	0.009	0.58	0.39–0.86

Table 5 presents the overall vaccine acceptance among participants. Out of the total respondents, 878 individuals (70.8%) reported accepting vaccination, whereas 362 individuals (29.2%) refused it. This indicates that a clear majority of the study population was willing to receive the vaccine, although nearly one-third remained hesitant or unwilling, highlighting the presence of substantial vaccine refusal within the population.

Table 5: Overall Vaccine Acceptance

Response	Frequency (n)	Percentage (%)
Accept	878	70.8
Refuse	362	29.2

Discussion

The current research showed that 70.8 percent of guardians were ready to vaccinate their adolescent girls against HPV, which showed that mostly the attitude was positive but still a significant percentage of them were reluctant. This is a lower acceptance level than the 86.7% acceptance in the discussed study, but still very high in comparison with the numbers recorded in some other countries, including China (46.3%) and Zhejiang Province (56.5%) (Zhang et al., 2023) [11]. The disparity can be the contextual difference in the awareness program, the availability of vaccines, and the sociocultural views. The fact that we have an average to high level of acceptance implies that there is a possible possibility of having awareness campaigns already affecting the perception but still there is an obstacle simply when compared to highly motivated populations. As with other moderate acceptance, this was also reported in Ethiopia, where parental willingness had a range of 6470% (Mihretie et al., 2022) [12], and, justifying the fact that developing regions have a tendency to have partial acceptance because of the lack of knowledge and price issues."

In our study, the level of knowledge about HPV was moderate, as more than 71.3% had heard about HPV and 77.1% knew that HPV is related to cervical cancer, but only 41.8% knew the recommended age of vaccination. Similar results were also noted with Central American immigrant parents, in which there was broad awareness and weak vaccine schedule-specific knowledge (Lindsay et al., 2020) [13]. Conversely, Poland-based studies also indicated an increase in structured knowledge because of arranged public health messaging (Smolarczyk et al., 2022) [14]. We have a mean knowledge score (4.58 ± 1.82) that is in line with other studies that reveal that basic awareness tends to be higher than detailed knowledge and that incomplete knowledge is one of the causes of delayed decision-making instead of refusal. Notably, knowledge was a very strong predictor of acceptance (OR 2.74) in our analysis, which is not true in other multivariable analyses where knowledge became non-significant when other factors were taken into account (Lindsay et al., 2020) [13]. This distinction implies that knowledge remains a major determinant and not background qualities in our context.

Educational status was significantly and positively correlated with acceptance (OR 1.86), which is in line with the studies that verified that educated parents are more aware of the benefits of the vaccines and the severity of diseases (Gunes, 2020) [15]. Equally, Fujian Province mothers who had higher education had much higher chances of vaccinating their daughters (Lin et al., 2021) [16]. The urban-rural gap identified in our research, with urban

guardians being more accepting (OR 1.34), is similar to other literature indicating access to healthcare information and services to be determinant (Guo et al., 2022) [17]. The countryside hesitation can be caused by little contact with providers and old myths.

Our study showed that perceived risk of infection was one of the most significant predictors (OR 3.21). This is in line with the results of Black mothers in the United States, in which perceived susceptibility was a strong determinant of vaccine acceptance (Gray and Fisher, 2023) [18] [18] [18]. In situations where parents have identified their daughters as being at risk of HPV infection, they are more likely to become preventive. This association is continuously upheld by the health belief model, which states that perceived severity and susceptibility are the driving factors behind vaccination behavior rather than general awareness only (Baldwin et al., 2023) [19].

Centrality of the healthcare providers was highlighted as doctor recommendation was found to be the most powerful variable (OR 4.08). Strong correlations of this nature have been found to be repeatedly reported; medical advice was significantly associated with boosting vaccination uptake in the community-based studies and decision experiments (Wang et al., 2022; Ramanadhan et al., 2020) [20,21]. The social influence plays a role as well because parents tend to use credible sources to get out of the safety concerns. Research on social networks has demonstrated that vaccinated acquaintances decrease distrust and initiate acceptance (Fu et al., 2019) [22]. The relevance of physician led counseling in immunization programs is therefore supported by our findings.

The issue of side effects had a negative impact on the acceptance (OR 0.58), which is similar to that of multi-country parental surveys in which safety fear constituted one of the reasons to refuse (López et al., 2022) [23]. On the same note, fear of adverse reactions and lack of sufficient safety information were also mentioned by Ethiopian parents as key obstacles (Mihretie et al., 2022) [12]. Misinformation is still a powerful factor even in the face of substantial evidence about long-term safety of HPV vaccines (Yao et al., 2022) [24]. This implies that the communication strategies should no longer focus on raising awareness and should now respond to the safety myths.

In our study, it was also obvious that even though a significant proportion of participants were aware of the HPV transmission (72.7%), the preventive role of vaccination (82.6%), only 59.2% of people knew that they should still screen themselves after vaccination. Similar false beliefs were observed in massive surveys in China where the idea that vaccination is the eliminator of screening was misunderstood (Lin et al., 2024) [16]. Such misconception can decrease the efficacy of preventing cervical cancer in the long term, and it is necessary to combine education on both vaccination and screening.

In general, the findings indicate that there is a complex of knowledge, perceived risk, healthcare recommendation, and socioeconomic factors that make acceptance. Our acceptance rate is between low-awareness and high-awareness regions (when compared to other populations), which implies a phase of transition in the understanding of the population. Improved uptake could be achieved through a closer tie-on physician communication, special education in rural areas, and myth-busting safety initiatives. The fact that we have observed uniformity of our predictors in international evidence proves that the behavioral determinants of HPV vaccination are consistent around the world, but their magnitude is largely dependent on the access of healthcare and the quality of information locally.

Conclusion

Through this cross-sectional study, it has been established that though the majority of guardians of adolescent girls were mostly knowledgeable of HPV and HPV-related cervical cancer, there existed significant gaps in certain aspects of knowledge such as vaccination schedule and age recommendation. The general acceptance of HPV vaccination was good, although a significant number of guardians were still hesitant. The rate of acceptance was also much higher in the group that was more educated, lived in an urban area, had more knowledge and believed that their child was at risk of infection. The recommendation by the healthcare providers was identified as the most influential positive factor, and concern about vaccine safety diminished willingness. The results have shown that such a solution as providing more specific health education and reinforcing physician-based counseling can significantly increase the level of vaccine acceptance, which means that special awareness activities and the work aimed at reassuring the population of vaccine safety play a significant role in enhancing the health of the majority of people against cervical cancer.

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